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Produce Quality Spring Wheat

Cooperative Extension, South Dakota State University

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Produce Quality Spring Wheat

Practically all of South Dakota's wheats are marketed for human consumption. The high protein, strong gluten, hard red spring wheat is used by the milling and baking industry for making bread, rolls, hard rolls, buns and so on. The durum wheat is used in milling high quality Semolina flour for the manufacture of macaroni, spaghetti, soup alphabets, pizza base, ravioli, vermicelli, and other forms of edible pastes.

Selecting the best wheat variety for a particular farm is important. Growing an adapted variety or varieties and one accepted by the wheat milling and baking industry insures both stable production and a marketable crop. Recommendations given in this fact sheet and the variety descriptions should help South Dakota farmers choose their varieties.

WHEAT QUALITY IS MEASURED

Quality, measured by industrial consumers of wheat, involves at least 20 considerations, which are determined in complex laboratory facilities. Such facilities usually are associated with major mills and agricultural experiment stations. The South Dakota Agricultural Experiment Station has no cereal quality laboratory.

Laboratory measurements of flour quality fall into four major groupings. Hard red spring wheat is measured for: (1) a high content of desirable proteins, (2) a high yield of bran-free flour, (3) a flour of good dough strength suitable for mechanical mixing, and (4) a flour capable of absorbing a large amount of water and which will produce a large, uniform loaf of bread of good appearance. For durum wheats, there are additional measurements. Amber durum, which is used in specialized products such as macaroni, must contain a high percentage of vitreous (hard texture) kernels of a clear amber color. The carotene content must be high enough for deep yellow products, and this carotene color is developed best under cool ripening conditions. Weather and growing conditions influence the carotene level considerably.

The farmer and grain buyer, however, can predict wheat quality with reasonable success using these five rapid measures: (1) variety, (2) protein content, (3) test weight, (4) area of origin, (5) freedom from foreign material. Determining these five factors can affect the price of a bushel of wheat within a range of 80 cents.

By **Elmer Sanderson,** Extension Agronomist

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Cooperative Extension Service

SOUTH DAKOTA STATE COLLEGE

F.S. 47

The grower can influence the quality of his crop by the choice of variety. Protein content can be raised by good soil fertility practices. Prompt harvesting operations will help maximize test weights; this includes swathing before the crop is dead ripe and prevention of weathering. Good storage to prevent contamination of grain by rodent, storage insects, and birds will keep down foreign material. Good management and harvesting practices will reduce the content of weed seeds, sticks, and pebbles.

WHEAT FITS ROTATION

Spring wheat fits in various rotation systems. In the western and central areas where summer fallow has become a common practice, wheat is usually the first crop chosen after fallow because of its relatively high cash value. While wheat yields on fallow land seldom double yields of comparable wheat after non-fallow, the additional stored moisture gets the crop off to a quick start. Wheat, after fallow, benefits also from economy in operation, better distribution of labor, less chance of crop failures, and better weed control. However, the purpose of fallowing can be defeated if the system of management fails to control wind erosion.

The next best place for wheat in rotation is after an intertilled or row crop that leaves the soil in condition to be prepared quickly for spring planting. Wheat yield is greater when it follows a row crop than when it follows another small grain crop. However, corn and other row crop acreages are not great in the spring wheat area, so some of the wheat acreage necessarily must follow wheat or another small grain.

SOIL FERTILITY IS IMPORTANT

Wheat, like all small grains, makes its growth in early spring when soils are still cold, and nitrogen release is low. If available plant food is lacking—espe-

cially nitrogen—the wheat plants will be yellow, have only a few or no tillers, and reach little height. This will limit the yield. Adequate soil fertility can be maintained by (1) conservation of all crop residues, (2) incorporating a grass and legume in the cropping system, (3) use of all available barnyard manure, (4) use of a green manure crop such as a sweetclover-fallow practice, and (5) wise use of commercial fertilizer. Research tests show that the protein content of wheat can be influenced by the available nitrogen in the soil.

A 20-bushel wheat crop will remove about 30 pounds of nitrogen, 12 pounds of phosphate and 7 pounds of potash per acre from the soil, assuming that the straw is being returned to the land and not burned off. We know that South Dakota soils are high in potash and so this plant food is not a limiting factor in wheat yields. On this basis, the application of fertilizer containing about 20 to 30 pounds of nitrogen and 10 to 15 pounds of phosphate per acre would be justified.

The rainfall area, the soil fertility level, and the soil moisture relationship must be considered. There is some question as to whether the use of commercial fertilizers will pay every year in the lower rainfall areas in western South Dakota. So far, it has not been practical to apply a nitrogen fertilizer on fallow land. In general, soil tests should be made to accurately determine soil fertility levels and plant food needs.

An attachment on the grain drill for applying commercial fertilizers is usually preferred over the broadcast method. The attachment places the fertilizer in moist soil with, or near, the seed for immediate use by the wheat seedling.

SEEDBED PREPARATION CAN VARY

Method of seedbed preparation will vary in different areas of the state and according to the previous crop or tillage operation. Shallow cultivation on fallow will avoid excessive moisture loss by evaporation, and yet kill weeds and leave a firm moist seedbed. Seedbed preparation and planting may be done in one operation.

Double disking and harrowing is a common method of preparing a seedbed on row crop land. This method is relatively cheap, fast, and leaves 3 to 4 inches of loose, friable soil on the surface with firm soil beneath. Plowing or one-waying is the usual practice when wheat follows wheat or another small grain. Sometimes corn land is also plowed and this can help reduce the possibility of scab. Plowed land should be packed to conserve moisture and to facilitate uniform planting of the wheat seed.

The pony-press drill behind a plow and packer is a common and efficient method of seedbed preparation and planting—in a single operation. The plow, pack, and pony-press drill practice conserves moisture, plants seed in moist soil for immediate germination, and controls many common annual weeds. It is not quite as rapid as some other methods, however.

CLIMATE DETERMINES SEEDING TIME

Wheat should be planted as soon as the soil can be properly worked with the usual farming equipment. Wheat seedlings are somewhat tolerant to cold and freezing temperatures, and early planting favors both yield and quality. Therefore, the usual practice is to plant wheat first. According to some early research trials conducted in South Dakota, the optimum seeding date for hard red spring wheat is between March 15 and April 1. The optimum date for durum wheat is between April 1 and April 15. Climate will largely determine when field work will start in any given year, so that no specific seeding date can be followed too closely.

SEED WHEAT WITH GRAIN DRILL

Wheat should be seeded with a grain drill. Drilling distributes the seed evenly at a uniform depth in moist soil where conditions are favorable for germination. A drill with press wheels is best, but double disk or single disk drills can be improved with packer wheel attachments. Pony-press drills are excellent, as noted earlier.

Hard red spring wheat should be seeded at the rate of about 1 bushel or 4 pecks per acre in the central and western areas and 5 pecks per acre in the eastern counties where rainfall is usually greater. The seed size of durum wheat is larger, so the rate of seeding can be increased slightly. Durum wheat is often seeded at 1½ bushels or 6 pecks per acre in the northeast durum growing areas. This rate of seeding is based on clean seed of high germination. If it becomes necessary to plant seed of inferior germination, the seeding rate must be adjusted.

USE GOOD SEED

Use of pure weed-free seed of high germination is the first requirement for a successful crop. Certified seed is a farmer's best assurance of good seed, although homegrown uncertified seed can be used satisfactorily. Such seed must be carefully cleaned to remove cracked kernels, dirt, chaff, and weed seeds.

SEED TREATMENT

Proper seed treatment with a recommended chemical is always a good practice. This treatment controls covered smut of wheat (also called "bunt" or "stinking smut") and certain other seed-borne diseases. Several good seed treatments or fungicides are on the market, and the actual cost per acre of treating is small. Custom treating is practical for some seed lots. In treating seed on the farm, follow the instructions on the seed treatment container as to rate and method of

treatment. Thorough mixing of the fungicide and seed is necessary to get good seed coverage and to derive maximum benefits from the treatment. It is especially important to treat early planted seed and all durum wheat.

CONTROL WEEDS

Weeds are often a factor in reducing wheat yields. A planned cultural weed control program should be practiced throughout the rotation and supplemented with herbicides as necessary. Wheat is quite tolerant to 2,4-D sprays. As much as one-third pound of 2,4-D acid in an ester form or one-half pound of an amine form per acre can be applied without causing any damage during the tolerant periods of growth (usually between the 5-leaf and early boot stages).

Wild oats is a serious weed problem in the spring wheat producing areas, both in the field and in the market. An application of one-third pound of barban (trade name—Carbyne) when wild oats have 2 leaves, stunts the growth of wild oats in the stand without damaging the wheat. Treatment with 1¼ pounds of another new chemical (trade name—Avadex) before the plants are up, generally kills most of the wild oats and can be used in durum wheat but not on the bread wheats. For complete information on all types of herbicides to control weeds in wheat, consult your County Extension Agent or the Agricultural Experiment Station.

HARVEST AND STORE WHEAT CAREFULLY

The most common method of harvesting spring wheat in South Dakota is the windrowing-combining sequence. Problems of weeds, uneven ripening, shattering, and high moisture grain are eliminated. Swathing may be started when the kernels reach the hard dough stage. Combining must be delayed until the moisture content of the wheat kernels is 13% or less. Grain for long-time storage must not exceed 12% moisture.

Clean thoroughly the walls and floors of used bins to remove old grain. If bins are infested with grain storage insects, spray the walls and floor with an approved insecticide. Bins should be weatherproof to keep out rain and snow, and rodent and bird proof to prevent contamination. **Remember wheat is human food—keep it clean.**

SELECT A VARIETY

The list of recommended varieties shown in the table is based on reliable and impartial information obtained from Experiment Station tests conducted throughout the state. These recommendations are based not only on yield but also on earliness, disease and insect resistance, straw strength, grain quality, market needs, and so forth. Variety recommendations, according to "crop adaptation areas" are given in Extension Fact Sheet (F. S.) 41.

HARD RED* SPRING WHEAT	Yield	Date Mature	Plant Height	Lodging Resistance	Awn Type	Bushel Weight	Quality†	Disease Reaction‡ Stem§ Rust	Leaf Rust	Bunt	Loose Smut	Scab
Varieties Recommended												
Canthatch	Medium	Medium	Medium	Good	Beardless	Medium	Satisfactory	MR	VS	R	R	S
Conley	Low	Late	Tall	Medium	Bearded	Medium	Satisfactory	R	MR	R	R	S
Lee	Medium	Early	Short	Medium	Bearded	High	Satisfactory	S	MS	R	S	VS
Pembina	High	Medium	Medium	Good	Beardless	Medium	Satisfactory	R	MR	R	R	S
Rushmore	Medium	Early	Medium	Good	Beardless	High	Satisfactory	S	S	R	R	S
Selkirk	High	Medium	Medium	Good	Beardless	Medium	Satisfactory	R	MR	R	R	S
Varieties Not Recommended												
C.T. 231	High	Early	Short	Medium	Bearded	High	Unsatisfactory	R	MS	MS	S	VS
Mida	High	Medium	Tall	Medium	Bearded	High	Satisfactory	S	S	MS	R	S
Spinkcota	High	Medium	Tall	Poor	Bearded	High	Unsatisfactory	S	VS	MS	R	S
Thatcher	Low	Early	Short	Good	Beardless	Medium	Satisfactory	S	VS	MS	S	S
DURUM WHEAT												
Varieties Recommended												
Lakota	High	Early	Short	Good	Bearded	Medium	Satisfactory	R	MR	R	R	S
Langdon	High	Medium	Medium	Medium	Bearded	High	Satisfactory	MR	MR	R	R	S
Ramsey	Medium	Medium	Medium	Poor	Bearded	High	Satisfactory	MR	MR	R	R	S
Wells	High	Early	Short	Good	Bearded	Medium	Satisfactory	R	R	R	R	S
Varieties Not Recommended												
Golden Ball	Medium	Medium	Tall	Poor	Bearded	Medium	Unsatisfactory	S	MR	MS	R	S
Mindum	Medium	Late	Tall	Poor	Bearded	High	Satisfactory	S	MR	MR	R	S
Sentry	Medium	Early	Short	Medium	Bearded	High	Satisfactory	MS	R	R	R	VS
Stewart	High	Late	Tall	Poor	Bearded	High	Satisfactory	S	MR	R	R	S
Yuma	Medium	Late	Medium	Poor	Bearded	High	Satisfactory¶	MR	MR	R	R	S

*Varieties are listed alphabetically and not in order of importance.
†Quality as determined by the needs of the milling and baking industry.
‡The symbols used to indicate degree of resistance are: R=resistant; MR=moderately resistant; S=susceptible; VS=very susceptible; MS=moderately susceptible.
§Resistance referred to in this column is concerned with Race 15B of stem rust.
¶Semolina used primarily for soup alphabets.

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